

REMARKS

Reconsideration and withdrawal of the rejections set forth in the above-mentioned Official Action in view of the following remarks are respectfully requested.

Claims 1-10 remain pending in this application, and are each independent.

Claims 1, 2, 9 and 10 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent Application Publication No. 2002/0041310 (Kaneko et al.) in view of U.S. Patent No. 6,086,197 (Kubota et al.) and U.S. Patent No. 6,494,569 (Koitabashi et al.). Claims 3-8 were rejected under § 103 as being unpatentable over Koitaabashi et al. in view of Kaneko et al. These rejections are respectfully traversed.

As recited in certain independent claims, a pigment ink having a surface tension lower than that of a reaction liquid is ejected to the reaction liquid ejected on the surface of the recording medium (Claims 1 and 2). Alternatively, the claims recite that the reaction liquid has a surface tension higher than that of the pigment ink and the pigment ink is ejected to the recording medium in such a manner that the pigment ink is brought into contact with the reaction liquid present in a liquid state on the surface of the recording medium (Claims 3 and 4), or a pigment ink contains a surfactant in a higher content than that of the reaction liquid and the pigment ink is brought into contact with the reaction liquid present on the surface of the recording medium (Claims 5 and 6). Further, certain claims recite that the pigment ink has a surface tension lower than that of the reaction liquid and the reaction liquid is brought into contact with the pigment ink on the surface of

the recording medium (Claims 7 and 8), or the pigment ink contains a surfactant in a higher content than that in the reaction liquid and the pigment ink is ejected to the recording medium in such a manner that the pigment ink is brought into contact with the reaction liquid present in a liquid state on the surface of the recording medium (Claims 9 and 10). Further, each claim recites that the recording duty of the reaction liquid satisfies the formula

$$55 \times \frac{0.85 \times 10^{-6} \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^{-6} \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)}.$$

With the above arrangements and methods, the drawbacks caused by applying too much reaction liquid (as described in the specification beginning at page 31, line 11) or applying an insufficient amount of reaction liquid (page 32, line 1) can be prevented. For example, when bringing a pigment ink having a lower surface tension into contact with the reaction liquid on a recording medium, pigment agglomerates can migrate on the surface of the reaction liquid, to cause bleeding. With the present invention, however, because the recording duty of the reaction liquid can be applied within an appropriate range as defined by the formula, an excess amount of reaction liquid is prevented.

In the ink jet recording head and apparatus of Kaneko et al., the structural arrangement of the nozzles of the recording head are discussed (paragraphs [0151]-[0153]) and a temperature increase in two recording element chips recording at different duties is discussed (paragraph [0171]). Although Applicants agree that Kaneko et al. discloses specific values for the resolution of the nozzles, ejection amounts and printing duties, Applicants have never conceded that Kaneko et al. discloses or suggests the claimed formula regarding the recording duty of the reaction liquid, as is recited in each of the independent claims. Nowhere does Kaneko et al. disclose or suggest that the recording duty of any liquid satisfies the formula

$$55 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)} \leq duty(\%) \leq 125 \times \frac{0.85 \times 10^6 \times Vd(pl)^{-0.61}}{Rx(dpi)Ry(dpi)}.$$

Thus, Kaneko et al. fails to disclose or suggest important features of the present invention recited in the independent claims.

The Office Action points out that U.S. Patent No. 6,084,619 (Takemoto et al.) teaches that a colorant can be added to a reaction solution. However, even if one of the recording liquids in Kaneko et al. were replaced with a colored reaction solution, such modification would still not meet the formula for the duty of the reaction liquid.

Kubota et al. was cited for teaching the use of an ink and a reactant, each having a low surface tension. However, Kubota et al. is also not believed to remedy the deficiencies of the citations noted above with respect to the independent claims.

In the ink jet printing method of Koitabashi et al., a pigment ink and a treatment liquid are mixed in a liquid state on the printing medium. Koitabashi et al., however, also does not disclose or suggest the formula regarding the recording duty of the reaction liquid and is not any more relevant than the citations noted above in that regard.

Thus, independent Claims 1-10 are patentable over the citations of record. Reconsideration and withdrawal of the § 103 rejections are respectfully requested.

Applicants submit that the present application is in condition for allowance. Favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action, and an early Notice of Allowability are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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